

the material on which it is to be used. The type, number, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition.

NOTE: The use of equipment which crushes the aggregate will not be permitted.

401.04. CONSTRUCTION METHODS.

- (a) **Tolerances.** In order to provide acceptable smoothness, width, and thickness, maintain accurate control in placing, spreading, finishing, and compacting surface courses. Use equipment as may be required to provide acceptable construction within the prescribed tolerances.

| SURFACE TYPE | SECTION | TOLERANCES | |
|-------------------------------------|---------|-----------------------------------|--------------------------------------|
| | | <u>SURFACE</u> | <u>THICKNESS</u> |
| Open Graded Friction Course | 406 | 1/8 inch in 10 feet (3 mm in 3 m) | Reasonable Conformity with the Plans |
| Plant Mix Asphalt Concrete Pavement | 411 | 1/8 inch in 10 feet (3 mm in 3 m) | same as above |
| P.C. Concrete Pavement | 414 | 1/8 inch in 10 feet (3 mm in 3 m) | See Section 414 |

All pavement will be subject to straightedge inspection during construction operations. The Engineer will make tests with a 10 foot (3m) straightedge or other approved device for compliance with specified surface tolerances at selected locations. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall at no point exceed the specified tolerance. Correct humps or depressions exceeding the specified tolerance in an acceptable manner.

- (b) **Traffic.** Prior to construction equipment being placed on new or existing pavement, provide the Engineer with a procedure that contains all of the measures and methods to be used to protect the pavement from damage. If any spalling, cracking, chipping, rutting, or other defacing of the pavement is caused by construction operations, repair the surface(s) to new-pavement condition at no additional cost to the Department of Transportation. Refer to Section 105.07 of the Standard Specifications for projects with multiple Contractors in the same project limits.

SECTION 402 BITUMINOUS SURFACE TREATMENT

402.01. DESCRIPTION.

This work shall consist of the construction of an acceptable single- or double-surface treatment of aggregates and bituminous materials; this means that the surface is free from bleeding, loose chips, loss of imbedded aggregates, or other defects in accordance with these Specifications, and is in reasonably close conformity with the lines shown on the Plans or established by the Engineer.

402.02. MATERIALS.

Materials shall meet the requirements specified in the following Subsections of Section 700 - Materials:

| | |
|---|--------|
| Cover Aggregates No. 1, No. 2, No. 3, and No. 3C | 703.02 |
| Bituminous Prime | 708.03 |
| Bituminous Binder | 708.03 |

Use cover aggregates No. 2, No. 3, or No. 3C for Single Bituminous surface treatments, unless otherwise specified. Cover Aggregates No. 1 and No. 2 will be used for Double Bituminous treatments, unless otherwise specified.

402.03. EQUIPMENT

Distributors, Supply Tanks, and Compactors shall meet the requirements of Subsection 401.03.

The spreader shall operate independently of supply trucks, receiving the aggregate directly from the supply trucks into a hopper which feeds the aggregate into a spreader box. The spreader shall be equipped with controls which permit the spreading of aggregate at various controlled rates from 10 to 45 pounds per square yard (5 to 25 kg/m²) and in width from 3 feet to 12 feet (0.9 to 3.6 m) up to 24 feet (7.2 m) if full width cover is desired.

402.04. CONSTRUCTION METHODS

- (a) **Weather and Seasonal Limitations.** Limit the construction of bituminous surface treatment to the following weather and seasonal limitations.
- (1) **General.** Weather and seasonal conditions set forth herein for construction of bituminous surface treatment will not preclude the provisions of Subsections 105.14 and 105.17 for acceptance of the work.
 - (2) **Seasonal Limitations.** The target calendar dates between which bituminous surface treatment may be applied for the various types of bituminous materials that may be used are given in Table I.

TABLE I: CONSTRUCTION SEASONAL LIMITATIONS

| | |
|--------------------|-------------------------|
| Cutback Asphalt | April 1 through Nov. 15 |
| Asphalt Cement | May 1 through Sept. 30 |
| Emulsified Asphalt | May 15 thru Sept. 15 |

Limit the construction of bituminous surface treatment to the above calendar day periods. When a request is made in writing and so approved by the Engineer, the beginning and/or ending dates may be modified; however, the temperature and weather limitations specified in Subsection 3 under Table II shall apply to the work at all times.

- (3) **Temperature and Weather Limitations.** The temperature and weather limitations for applying the various materials for bituminous surface treatment will be restricted under the conditions listed in Table II and as herein specified. Measure ambient temperatures in the shade 4 feet (1.2 m) above the ground away from artificial heat.

When construction of bituminous surface treatment is permitted outside the seasonal limitation dates specified in Table I, it is the intent of these Specifications that temperature and weather conditions will be favorable for completion of the work planned. This means that the

minimum temperatures set forth for application of the materials in Table II have also occurred on the previous calendar day.

Work shall be suspended at any time the temperature falls below the specified minimum temperatures or does not comply with restricted application conditions. Work shall also be suspended at any time due to adverse weather, such as wind chilling the bituminous binder, rain, foggy conditions, or when in the opinion of the Engineer an abnormally high relative humidity exists.

TABLE II: TEMPERATURE AND WEATHER LIMITATIONS

| BITUMINOUS MATERIALS | AMBIENT TEMP. (MIN.) | SURFACE TEMP. (MIN.) | AGGREGATE TEMP. (MIN.) | BASE OR PAVEMENT |
|----------------------|----------------------|----------------------|------------------------|----------------------------------|
| | | | | SURFACE CONDITION DUE TO WEATHER |
| Cutback Asphalt | 50°F (10°C) | 60°F (15°C) | 40°F (4°C) | Dry |
| Emulsified Asphalt | 60°F (15°C) | 70°F (20°C) | 50°F (10°C) | No visual free moisture present |
| Asphalt Cement | 60° (15°C) | 70° (20°C) | 50° (10°C) | Dry |

- (4) **Detours and Shoo-Flys.** At the discretion of the Engineer, the minimum temperatures specified for application of bituminous surface treatment may be waived for temporary construction on detours and shoo-flies or other incidental construction.
- (b) **Traffic.** Provide traffic control so that (1) no vehicles are permitted to pass over the surface treatment until the cover material has been applied and properly stabilized and (2) no unnecessary risk to the health, safety, property, or delay to the traveling public is incurred.
- (c) **Preparation of Base.** Prior to the construction of the bituminous surface treatment, bring the base reasonably true to the lines, grades, and typical cross sections shown on the Plans. Where the existing base has been previously sealed or patched with bituminous materials, completely remove any excess or fatty areas of such patches or sealing from the surface of the base course before applying bituminous binder for surface treatment. Preparation of the base will be measured for payment under Subsection 402.05.
- Prior to placing the prime coat, thoroughly clean the base of dust, clay, or other foreign matter.
- (d) **Protection of Structures.** When applying bituminous materials, protect the surfaces of all structures to prevent them from being discolored.

- (e) **Heating Bituminous Material.** Heat bituminous materials in such a manner as to insure the even heating of the entire mass with an effective and positive control at all times. Heat it to a degree consistent with the type of material used as specified under Subsection 708.03 and only to such temperatures as will insure the necessary fluidity.

NOTE: Introduction of steam into bituminous materials for heating will not be permitted, and no flame shall come into contact with the bituminous material or container. Any bituminous material which has been overheated or otherwise damaged will be rejected.

- (f) **Application of Prime.** Apply, measure, and be paid for the prime coat in accordance with the provisions of Section 408, when specified.
- (g) **Application of Tack Coat.** Apply, measure, and be paid for the tack coat in accordance with the provisions of Section 407, when specified.
- (h) **Application of Bituminous Binder and Cover Aggregate.** Application of bituminous binder will be permitted only when aggregate is immediately available for spreading over the freshly applied bituminous binder. Prior to applying the bituminous binder, thoroughly clean the primed base of dirt and loose material. Do not apply the first application of bituminous binder until sufficient time has elapsed to allow both proper penetration and hardening of the prime coat.
- (1) **Bituminous binder.** Uniformly apply the binder to the surface to be treated and delineate one edge of the bituminous surfacing in advance of the first application of bituminous binder. In order to prevent overlapping or missing of bituminous binder at transverse joints, spread building paper over the treated surface for a sufficient distance back, so as to allow the distributor nozzles to operate at full force when the uncovered surface is reached. Afterwards, remove and dispose of the paper.

NOTE: When the road is closed to traffic and the surface width does not exceed 24 feet (7.3 m), you may apply materials to the full surface width in one pass for each individual application. When the road is not closed to traffic, apply prime and bituminous material one-half width at a time. When the second half of the roadbed is "shot," the distributor nozzle nearest the center of the road shall overlap the previous application by at least one-half the width of the nozzle spray but shall not exceed the full width.

- (2) **Cover aggregate.** Immediately after applying the bituminous binder, apply cover aggregates at the approximate rates specified below by means of approved, self-propelled mechanical spreaders mounted on pneumatic tired traction wheels which will accurately and uniformly spread the cover material in the required amount. In areas inaccessible to the mechanical spreaders, hand spreading will be permitted.
- (3) **General application requirements.** Throughout the application process, make any/all necessary adjustments to obtain a satisfactory surface. If deemed necessary, the Engineer may terminate the surfacing operation until such time as satisfactory performance can be obtained.

There must be no overlaps (except as otherwise provided), streaks, or gaps in the application of bituminous binder and cover aggregate.

The distribution and coverage rate of the bituminous material and cover aggregate shall be determined for individual projects. The following table is included for estimating quantities and is based on midpoint requirements of bituminous binder and aggregate based on the Asphalt Institute's formula for bituminous surface treatments.

**APPROXIMATE RATES PER SQUARE YARD
(SQUARE METER) OF SURFACE:
PRIME COAT - 0.1 to 0.4 gallon (0.45 L to 1.8 L).**

| | No. 1 | No. 2 | No. 3 | No. 3C |
|--------------------------|-------------------------|------------------------------------|-----------------------------------|--------------------------------|
| | <u>Aggregate</u> | <u>Aggregate</u> | <u>Aggregate</u> | <u>Aggregate</u> |
| Single Treatment: | | | | |
| Aggregate | | 25 pounds (14 kg) | 28 pounds (15 kg) | 35 pounds (19kg) |
| Bituminous Binder* | | 0.25 to 0.3 gallons (1.1-1.4 L) | 0.25 to 0.3 gallons (1.1-1.4L) | 0.3to3.5gallons (1.1-1.6 L) |
| Double Treatment: | | <u>1st Increment</u> | <u>2nd Increment</u> | |
| Aggregate | 40 pounds (22 kg) | 20 pounds (11 kg) | 15 pounds (8 kg) | |
| Bituminous Binder* | 0.4 gallons (1.8 L) | 0.2 gallons (0.9 L) | 0.15 gallons (0.7 L) | |

* *The amounts of bituminous binder are amounts of residual asphalt. Temperature application of bituminous binder shall be in accordance with Section 708 for the type of material being used.*

The sequence for applications of bituminous binder and cover aggregate shall be as follows:

Single Treatment. Apply bituminous binder, and spread No. 2, or No. 3, or No. 3C cover aggregate over the surface at the determined rates.

Double Treatment. For the first application, apply bituminous binder, and spread No. 1 cover aggregate over the surface at determined rates.

For the second application, apply bituminous binder on the surface of the No. 1 cover material; then spread the first application of No. 2 cover aggregate (1st increment) over the surface at the determined rates.

For the third application, apply bituminous binder on the surface of the No. 2 cover material, and spread the second application of No. 2 cover aggregate (2nd increment) over the surface at the determined rates.

- (i) **Rolling.** Thoroughly roll the entire surface after each application of cover aggregate, which must be firmly imbedded into the bituminous binder.

While the rolling is in progress, spread additional aggregate by hand in whatever quantities are required to fill irregularities and to cover bare spots to prevent the picking up of bituminous binder.

The final rolling of the entire surface of the cover material shall consist of at least four coverages with a pneumatic-type roller meeting the requirements of Subsection 401.03 and operated at a speed of not more than 7 miles per hour (10 km/h).

- (j) **Maintenance.** Remove unsatisfactory material and make repairs with additional bituminous binder and aggregate so that a uniformly dense treatment with maximum retention of the cover aggregate is maintained until final acceptance of the job. Correct any irregularities with additional wearing course materials, and do not measure such materials for payment.

For excessive bleeding, apply blotting materials which are free from clay, silt, loam, or other foreign matter in the manner and amounts acceptable to the Engineer.

402.05. METHOD OF MEASUREMENT.

Bituminous binder will be measured by the ton (metric ton) of residual asphalt.

Cover aggregate will be measured by the ton (metric ton). All weight of moisture in excess of 3 percent of oven dry weight will be deducted from the pay quantity. Sand or other approved aggregate, as may be required for blotting, will be measured for payment and included in cover aggregate No. 2, No. 3, or No. 3C.

Preparation of base when indicated on the Plans will be measured by the station (kilometer).

402.06. BASIS OF PAYMENT.

Accepted quantities, measured as provided above, will be paid for at the contract unit price as follows:

| | | |
|--------|--|------------------|
| (A) | BITUMINOUS BINDER | TON (METRIC TON) |
| (B-1) | NO. 1 COVER AGGREGATE | TON (METRIC TON) |
| (B-2) | NO. 2 COVER AGGREGATE | TON (METRIC TON) |
| (B-3) | NO. 3 COVER AGGREGATE | TON (METRIC TON) |
| (B-4) | NO. 3C COVER AGGREGATE | TON (METRIC TON) |
| (B-2P) | PRECOATED NO. 2 COVER AGGREGATE | TON (METRIC TON) |
| (B-3P) | PRECOATED NO. 3 COVER AGGREGATE | TON (METRIC TON) |
| (B-4P) | PRECOATED NO. 3C COVER AGGREGATE | TON (METRIC TON) |
| (C) | PREPARATION OF BASE | STATION (KM) |

Such payment shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.